

REMARKS

Applicant thanks the Examiner for the thorough consideration given the present application.

Claims 1, 2, 4, 6-15, 17 and 19-29 are now present in this application. Claims 1, 14 and 27 are independent.

Claims 3, 5, 16 and 18 have been canceled, and claims 1,2, 6-15, 17 and 19-29 have been amended. Reconsideration of this application, as amended, is respectfully requested.

Rejection Under 35 U.S.C. § 101

Claims 1-13 are rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter. The Examiner states that a statutory process must be tied to another statutory category or transform underlying subject matter. The Examiner also states that the claims can be reasonably interpreted as a series of steps completely performed mentally, verbally or without a machine. Applicant respectfully disagrees as the claims are tied to another statutory category and transform underlying subject matter.

In the process recited in the claims, the input audio stereo signal is transformed by the process. In addition, the process uses an audio stereo reproduction system to process an audio signal, as a left output signal and right output signal are produced. The claimed method of processing an input audio stereo signal cannot be completely performed mentally, verbally or without a machine. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested. If the Examiner maintains this rejection, Applicant requests a brief explanation of how the process can be completely performed mentally, verbally or without a machine.

Rejection Under 35 U.S.C. § 103

Claims 1-10, 12, 14-23, 25 and 27-29 stand rejected under 35 U.S.C. § 103 as being unpatentable over WO 01/39548 (Heed et al.) in view of US 6,760,447 (Nelson). Claims 11 and 24 stand rejected under 35 USC 103 as being unpatentable over Heed et al. and Nelson, as applied to claim 1 and further in view of US 6,590,983 (Kraemer). Claims 13 and 26 stand rejected under 35 USC 103 as being unpatentable over Heed et al. and Nelson, as applied to

claim 1 and further in view of US 5,896,456 (Desper). These rejections are respectfully traversed.

The present invention relates to a combination of method steps as set forth in claims 1-13, a combination of elements as set forth in device claims 14-26 and a combination of system claims as set forth in claims 27-29 for processing an input audio stereo signal comprising two input signals for reproduction of a processed stereo signal in an audio stereo reproduction system. The method, device and system include at least one pair of loudspeaker elements. A left output signal is or is equivalent to the sum of the mid input signal and the side input signal. A right output signal is or is equivalent to the sum of the mid input signal and the side input signal phase shifted 180°. The method, device and system is characterized in that at least part of the side input signal or the mid input signal in the frequency range 4 kHz to 9 kHz is phase shifted at least 45° but no more than 135° relative to the other signal prior to or at the production of the left and right output signals.

While not conceding the appropriateness of the Examiner's rejections, but merely to advance prosecution of the instant application, Applicant respectfully submits that independent claim 1 has been amended to recite a combination of steps in a method of processing an input audio stereo signal comprising two input signals, for reproduction of a processed stereo signal in an audio stereo reproduction system comprising at least one pair of loudspeaker elements, the method including the steps of providing a mid input signal (M) and a side input signal (S), producing a left output signal for transmission to a left loudspeaker in said pair, which is, or is equivalent to, the sum of the mid input signal (M) and the side input signal (S), the mid input signal (M) being attenuated by a factor α and/or the side input signal (S) being amplified a factor β , the factor α and/or β corresponding to an attenuation factor α in the range - 3 dB to -15 dB, c) producing a right output signal for transmission to a right loudspeaker in said pair, which is, or is equivalent to, the sum of the mid input signal (M) and the side signal (S) phase shifted 180°, the mid input signal (M) being attenuated by a factor α and/or the side input signal (S) being amplified a factor β , the factor α and/or β corresponding to an attenuation factor α in the range - 3 dB to -15 dB. The method further including the step of at least a part of the side input signal (S) or the mid input signal (M) in the frequency range 4 kHz - 9 kHz is phase shifted at least 45°

but no more than 135° relative to the other signal prior to or at the production of the left and right output signals in steps b) and c).

Applicant respectfully submits that this combination of steps as set forth in independent claim 1 is not disclosed or made obvious by the prior art of record, including Heed et al. and Nelson.

As acknowledged by the Examiner, the Heed et al. patent does not disclose the step or means wherein at least a part of the side input signal (S) or the mid input signal (M) in the frequency range 4 kHz-9 kHz is phase shifted at least 45° but no more than 135° relative to the other signal prior to or at the production of the left and right output signals. The Examiner relies on Nelson to render obvious the subject matter as set forth in the claims. This rejection is respectfully traversed.

Nelson describes a sound reproduction system that aims to solve the problem of conventional sound reproduction systems, wherein the stereo image is present at, in principle, one location only, and only a slight movement to either side from this preferred point has the result that the image breaks down completely.

Nelson does not disclose the claimed limitation of the side input signal (S) or the mid input signal (M) in the frequency range 4 kHz-9 kHz being phase shifted at least 45° but no more than 135° relative to the other signal prior to or at the production of the left and right output signals. The Examiner refers to col. 21, lines 38-45 for this disclosure. However, these lines refer to Figure 18 which discloses the difference between the phase responses shown in Figure 17. The loudspeaker elements are spaced apart 10° resulting in a spacing of 17cm and the distance from a listener to the loudspeaker elements being less than one meter. In actuality, the loudspeaker elements will be closer than 17 cm for frequencies above 500 Hz, requiring the listener to be extremely close to the loudspeaker elements. Nothing in Nelson suggests a span of less than 10°, as made clear by Figures 2a-c where the loudspeaker elements are not as close as possible and making the disclosure unsuitable for combination with Heed et al. to arrive at the claimed invention.

Moreover, the signal processing of Nelson differs from that of the claimed invention. The invention has a phase shift set a specific value to influence a particular frequency in the same manner at all times. In contrast, signal processing varies according to the desired result. Figure 18b depicts the phase difference with loudspeakers are a 10° and an image at a location 30° from

the listener, Figure 18a depicts an image at 15° and Figure 18c is for 45°. The difference in the phases, therefore, is not frequency dependent but on the virtual location of an element in the sound. These Figures depict a wrapped signal with the corresponding signals shown in Figures 17a-c.

In the case of common audio content, such as music, movies, and games, a phase difference of more than 360° is not the same as a 0° phase shift but a delay in time. With common audio content, it is incorrect to state that the phase shift of Figure 17a is the same as Figure 18a. Nelson utilizes time shifts, phase shifts and amplitude shifts to simulate a desired effect, as seen in Figures 19a-d where both time and amplitude shifts are apparent.

The difference between the invention and Nelson can be seen in the appended Figures 1 and 2. As can be seen, there is no effect at low frequencies and a phase shift of 90° at 8 kHz. The influence of the attenuation factor α is seen in the difference between Figures 1 and 2 since, in Figure 1 the attenuation factor α is set to 3dB while in Figure 2, the attenuation factor α is set to 15dB.

Claim 1 now recites the subject matter of claim 3 and 5 to clearly recite, inter alia, the attenuation factor α . Nelson does not disclose any such attenuation factor and the claim clearly defines the invention over the prior art. Claim 14, directed toward a device, and claim 27, directed toward a system, have been amended in a manner similar to claim 1 and are also allowable for the reason set forth above.

Applicant respectfully submits that the combinations of steps and elements as set forth in independent claims 1, 14 and 27 are not disclosed or made obvious by the prior art of record, including Heed et al. and Nelson, for the reasons explained above. Accordingly, reconsideration and withdrawal of these rejections are respectfully requested.

With regard to dependent claims 2, 4, 6-13, 15, 17, 19-26, 28 and 29, Applicant submits that these claims depend, either directly or indirectly, from independent claim 1, 14 or 27 which are allowable for the reasons set forth above, and therefore claims 2, 4, 6-13, 15, 17, 19-26, 28 and 29 are allowable. In addition, these claims recite further limitations which are not disclosed or made obvious by the applied prior art references. Reconsideration and allowance thereof are respectfully requested.

Conclusion

It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance.

If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone Chris McDonald, Registration No. 41,533, at (703) 205-8000, in the Washington, D.C. area.

Prompt and favorable consideration of this Amendment is respectfully requested.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Dated: September 22, 2009

Respectfully submitted,

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MODEL: ESP v2.5
TYPE: PC amplitude plot
Phase relative L/R
Setting Alpha 3dB
TEST signal Left input
DATE 20090502

L R

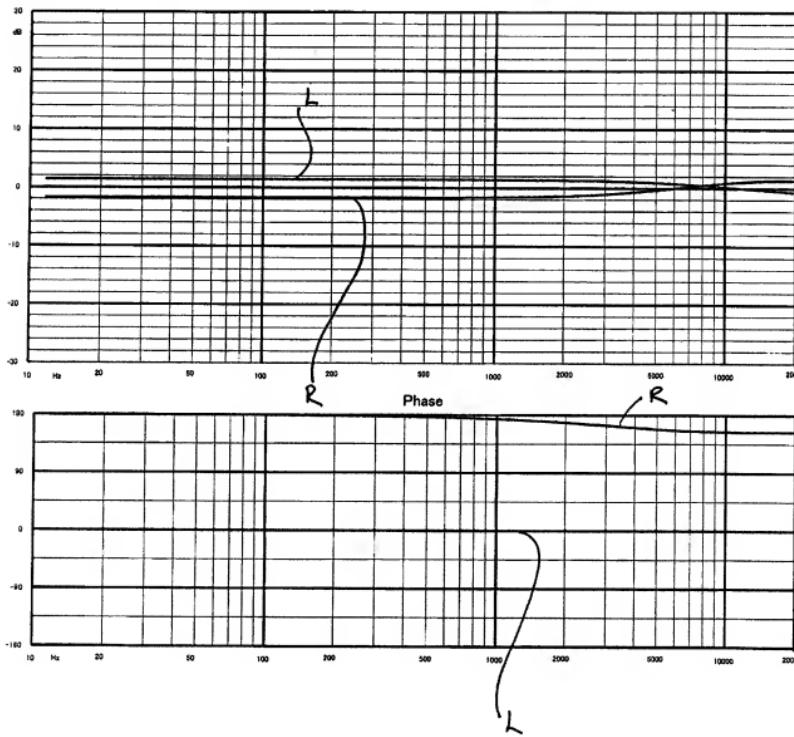


Fig. 1

Appendix

MODEL: ESP v2.5
TYPE: FC amplitude plot
Phase relative L/R
Setting Alpha 15.000000 dB
TEST signal Left input
DATE 20090502

L R

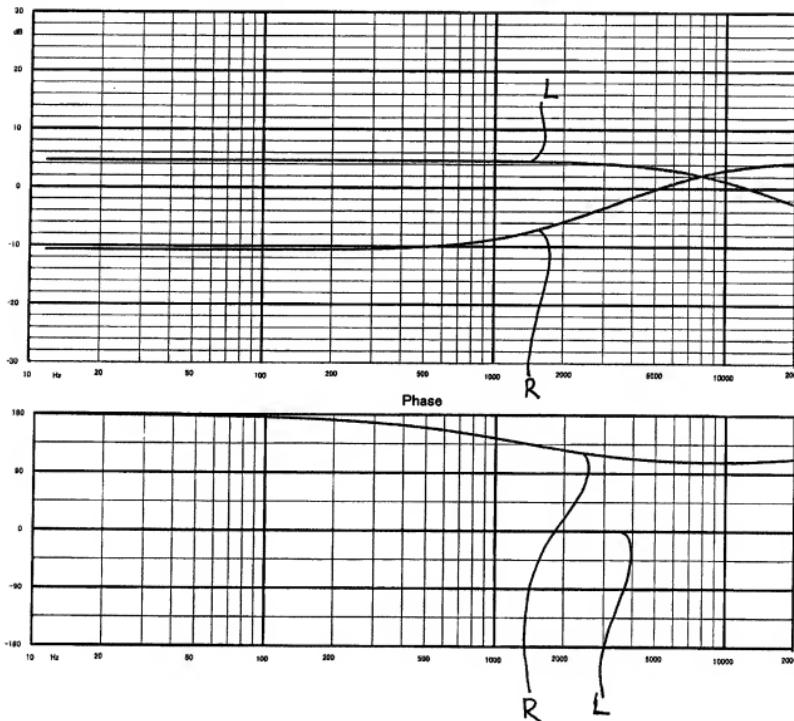


Fig. 2